Exercises for Integral calculus

17^{th} January, 2006

1. Find the definite integrals, $\int \left(20x^6 + 3x^4 - 6x^3\right) \mathrm{d}\, x$, $\int \frac{1}{x+1} \mathrm{d}\, x$, $\int 8\sqrt{x-7} \mathrm{d}\, x$, $\int 4e^{-3.5t} \mathrm{d}\, t$, and $\int 3x^{-\frac{2}{3}} \mathrm{d}\, x$.

2. Find the definite integral

$$\int \left(2e^{3t} - 3e^{-5t}\right) \mathrm{d}\, t$$

given an initial, or a boundary condition $F(0) = 3$.

3. Find the values of the definite integrals, $\int_1^3 5x^3 \mathrm{d}\, x$, $\int_1^2 4e^{\frac{t}{2}} \mathrm{d}\, t$, $\int_2^5 6x^{-3}$, and $\int_{-3}^{-1} (-4)e^{-2t} \mathrm{d}\, t$.

4. Find a firm's total revenue r_t function, given the marginal revenue function $r_m = -.2x^2 - 1.3x + 500$.

5. Let the present value be $p = a^{-rt}$ of the sum of money a to be received in the future when the interest is compounded continuously. Find the present value p_n of a stream of future income, that is to say, the money to be received each year for n years.

6. Find the following integrals and definite integrals.

$\int 8x^{\frac{2}{3}} \mathrm{d}\, x$	$\int_1^2 8x^{\frac{2}{3}} \mathrm{d}\, x$	$\int \sqrt{x+2} \mathrm{d}\, x$	$\int_1^2 \sqrt{x+2} \mathrm{d}\, x$
$\int \frac{3}{t^4} \mathrm{d}\, t$	$\int_1^2 \frac{3}{t^4} \mathrm{d}\, t$	$\int \left(10 - 2x^2\right) \mathrm{d}\, x$	$\int_1^2 \left(10 - 2x^2\right) \mathrm{d}\, x$
$\int 4(x-3)^{-3} \mathrm{d}\, x$	$\int_1^2 4(x-3)^{-3} \mathrm{d}\, x$		

Reference

Edward T Dowling. *Mathematical methods for business and economics.* Schaum's outline series, 1993